IN THE CLAIMS

1. (previously presented) A transmission apparatus adapted to receive instructions from a remote monitoring control terminal, comprising:

a multiplexing and demultiplexing section to carry out a multiplexing and a demultiplexing; and

an order wire section to convert received order wire signals demultiplexed by said multiplexing and demultiplexing section into analog signals, and to convert transmitting order wire signals into digital signals which are input to said multiplexing and demultiplexing section,

said order wire section comprising:

a codec section to carry out an analog-to-digital conversion and a digital-to-analog conversion with respect to order wire signals;

a branching and combining section to branch and combine analog order wire signals;

a 2-wire/4-wire converter which is capable of coupling to a telephone set; and

a monitoring processor which includes a storage section to store transmitting and received data, and an order wire monitoring controller,

said order wire monitoring controller controlling transmission of test data stored in said storage section to an order wire line, controlling storage of test data received via the order wire line to said storage section, and controlling transmission and reception of one of the received test data, analyzed data of the received test data, and judgment data indicative of a judgment result of a comparison of the analyzed data and threshold values, in response to an instruction from the monitoring control terminal.

2. (previously presented) The transmission apparatus as claimed in claim 1, wherein said monitoring processor further includes:

a data analyzer to analyze the received test data stored in said storage section and to obtain analyzed data; and

a comparing and judging section to obtain the judgment data indicative of a judgment based on a comparison of the analyzed data and the threshold values,

said order wire monitoring controller controlling said storage section and said data analyzer, and controlling transmission of the judgment data from said comparing and judging section, in response to an instruction from the monitoring control terminal.

Cont

3. (previously presented) The transmission apparatus as claimed in claim 1, wherein said order wire monitoring controller stores audio data in said storage section as the received test data, and controls a loop-back transmission of the audio data stored in said storage section to a transmitting source, in response to a lapse of a predetermined time or a transmission instruction from the monitoring control terminal.

4. (previously presented) An order wire transmission system which couples a plurality or transmission apparatuses via multiplexed lines which multiplex and transmit main and order wire signals, wherein:

each transmission apparatus includes a multiplexing and demultiplexing section and an order wire section, said order wire section comprising a codec section to carry out an analog-to-digital conversion and a digital-to-analog conversion with respect to order wire signals, a branching and combining section to branch and combine analog order wire

signals, a 2-wire/4-wire converter which is capable of coupling to a telephone set, and a monitoring processor responsive to a remote monitoring control terminal;

said monitoring processor including a storage section to store transmitting and received data, and an order wire monitoring controller to control transmission of test data stored in said storage section to an order wire line, to control storage of test data received via the order wire line to said storage section, and to control transmission of the received test data and analyzed data of the received test data; and

said order wire monitoring controller including a function of receiving and identifying control information which specifies transmission or reception of the test data, a function of transmitting the test data from said storage section when specified to transmit test data, a function of receiving and storing the test data in said storage section when specified to receive the test data, and a function of controlling transmission of one of the received test data stored in said storage section, the analyzed data of the received test data, and judgment data indicative of a judgment result of a comparison of the analyzed data and threshold values to the monitoring control terminal, after a predetermined time or at a specified time, in response to an instruction from the monitoring control terminal.

Cont B'

5. (original) The order wire transmission system as claimed in claim 4, wherein said monitoring processor further includes:

a data analyzer which analyzes the received test data stored in said storage section and obtains the analyzed data; and

a comparing and judging section which obtains the judgment data indicative of a judgment based on a comparison of the analyzed data and the threshold values,

said order wire monitoring controller controlling said storage section and said data analyzer, reception and identification of control information specifying transmission or reception of the test data, controlling transmission of the test data via the order wire line, controlling transmission of the judgment data from said comparing and judging section, and controlling reception of the test data via the order wire line.

6. (previously presented) The order wire transmission system as claimed in claim 4, wherein said order wire monitoring controller in said monitoring processor of each transmission apparatus stores audio data in said storage section as the received test data, and controls a loop-back transmission of the audio data stored in said storage section to a transmitting source, in response to a lapse of a predetermined time or a transmission instruction.

7. (previously presented) An order wire monitoring method for monitoring from a monitoring control terminal a quality of an order wire line which couples a plurality of transmission apparatuses via multiplexed lines which multiplex and transmit main and order wire signals, comprising the steps of:

remotely specifying, from the monitoring control terminal, a transmission apparatus which is to transmit test data as a specified transmitting apparatus, and a transmission apparatus which is to receive test data as a specified receiving apparatus;

transmitting the test data from the specified transmitting apparatus to the order wire line in response to a start of a test instructed from the monitoring control terminal;

receiving and temporarily storing the test data in the specified receiving apparatus;

transmitting ~~to~~ from the specified receiving apparatus to the monitoring control terminal via the specified transmitting apparatus one of the stored received test data, analyzed data of the received test data, and judgment data indicative of a judgment result of a comparison of the analyzed data and threshold values, after a predetermined time or at a specified time; and

monitoring, in the monitoring control terminal, the quality of the order wire line between the specified transmitting apparatus and the specified receiving apparatus.

8. (original) The order wire monitoring method as claimed in claim 7, which further comprises the step of:

converting DTMF signals into digital signals, and transmitting the digital signals to the order wire line as the test data, from at least one of the specified transmitting apparatus and the specified receiving apparatus.

9. (currently amended) The order wire monitoring method as claimed in claim 7, which further comprises the step of:

judging, in the specified receiving apparatus, an error in setting or connection of the order wire line if a condition S'/S < W is ~~satistifed~~ satisfied, where S' denotes a signal level of a fundamental wave of the analyzed data obtained by carrying ~~our~~ out a discrete Fourier transform with respect to the received test data, ~~Nmax denotes a maximum noise level, and~~ S denotes a signal level of the transmitting test data, and W denotes a threshold value.

10. (currently amended) The order wire monitoring method as claimed in claim 9, which further comprises the step of:

judging, in the specified receiving apparatus, a failure of the order wire line caused by accumulation of quantization errors if at least one of the conditions (S'/S) < T, (S'/Nmax) < U and Nmax > V is satisfied, where Nmax denotes a maximum noise level, T, U and V are threshold values, T denotes a signal level with which communication is possible, U denotes a signal-to-noise ratio level with which communication is possible, and V denotes a set noise level.

11. (previously presented) The order wire monitoring method as claimed in claim 7, which further comprises the step of:

judging, in the specified receiving apparatus, a failure of the order wire line caused by accumulation of quantization errors if at least one of conditions (S'/S) < T, (S'/Nmax) < U and Nmax > V is satisfied, where S' denotes a signal level of a fundamental wave of the analyzed data obtained by carrying out a discrete Fourier transform with respect to the received test data, Nmax denotes a maximum noise level, S denotes a signal level of the transmitting test data, T, U and V are threshold values, T denotes a signal level with which communication is possible, U denotes a signal-to-noise ratio level with which communication is possible, and V denotes a set noise level.

12. (previously presented) A transmission apparatus, comprising:

a multiplexing and demultiplexing section to carry out a multiplexing and a demultiplexing;

an order wire section to convert received order wire signals demultiplexed by said multiplexing and demultiplexing section into analog signals, and to convert transmitting order wire signals into digital signals which are input to said multiplexing and demultiplexing section;

said order wire section comprising:

a codec section to carry out an analog-to-digital conversion and a digital-to-analog conversion with respect to order wire signals;

a branching and combining section to branch and combine analog order wire signals;

a 2-wire/4-wire converter which is capable of coupling to a telephone set; and

a monitoring processor which includes a storage section to store transmitting and received data, and an order wire monitoring controller,

said order wire monitoring controller controlling transmission of test data stored in said storage section to an order wire line, controlling storage of test data received via the order wire line to said storage section, and controlling transmission and reception of one of the received test data, and judgment data indicative of a judgment result of a comparison of the analyzed data and threshold values,

said order wire monitoring controller storing audio data in said storage section as the received test data, and controlling a loop-back transmission of the audio data stored in said storage section to a transmitting source, in response to a lapse of a predetermined time or a transmission instruction.

13. (previously presented) An order wire transmission system which couples to a plurality of transmission apparatuses via multiplexed lines which multiplex and transmit main and order wire signals, wherein:

each transmission apparatus includes a multiplexing and demultiplexing section and an order wire section, said order wire section comprising a codec section to carry out an analog-to-digital conversion and a digital-to-analog conversion with respect to order wire signals, a branching and combining section to branch and combine analog order wire signals, a 2-wire/4-wire converter which is capable of coupling a telephone set, and a monitoring processor;

said monitoring processor including a storage section to store transmitting and received data, and an order wire monitoring controller to control transmission of test data stored in said storage section to an order wire line, to control storage of test data received via the order wire line to said storage section, and to control transmission of the received test data and analyzed data of the received test data; and

said order wire monitoring controller including a function of receiving and identifying control information which specifies transmission or reception of the test data, a function of transmitting the test data from said storage section when specified to transmit test data, a function of receiving and storing the test data in said storage section when specified to receive the test data, and a function of controlling transmission of one of the received test data stored in said storage section, the analyzed data of the received test data, and judgment data indicative of a judgment result of a comparison of the analyzed data and threshold values, after a predetermined time or at a specified time,

said order wire monitoring controller in said monitoring processor of each transmission apparatus storing audio data in said storage section as the received test data,

and controlling a loop-back transmission of the audio data stored in said storage section to a transmitting source, in response to a lapse of a predetermined time or a transmission instruction.

14. (previously presented) An order wire monitoring method for monitoring a quality of an order wire line which couples a plurality of transmission apparatuses via multiplexed lines which multiplex and transmit main and order wire signals, comprising the steps of:

specifying a transmission apparatus which is to transmit test data as a specified transmitting apparatus, and a transmission apparatus which is to receive test data as a specified receiving apparatus;

transmitting the test data from the specified transmitting apparatus to the order wire line in response to the start of a test;

receiving and temporarily storing the test data in the specified receiving apparatus;

transmitting to the specified transmitting apparatus one of the stored received test data, analyzed data of the received test data, and judgement data indicative of a judgment result of a comparison of the analyzed data and threshold values, after a predetermined time or at a specified time;

monitoring, in the specified transmitting apparatus, the quality of the order wire line between the specified transmitting apparatus and the specified receiving apparatus; and

judging an error in setting or connection of the order wire line if a condition S'/S < W is satisfied, where S' denotes a signal level of a fundamental wave of the analyzed

data obtained by carrying out a discrete Fourier transform with respect to the received test data, ~~Nmax denotes a maximum noise level, and~~ S denotes a signal level of the transmitting test data, and W denotes a threshold value.

15. (currently amended) The order wire monitoring method as claimed in claim 14, which further comprises the step of:

judging a failure of the order wire line caused by accumulation of quantization errors if at least one of conditions (S'S) < T, (S'/Nmax) < U and Nmax > V is satisfied, where Nmax denotes a maximum noise level, T, U and V are threshold values, T denotes a signal level with which communication is possible, U denotes a signal-to-noise ratio level with which communication is possible, and V denotes a set noise level.

16. (previously presented) An order wire monitoring method for monitoring a quality of and order wire line which couples a plurality of transmission apparatuses via multiplexed lines which multiplex and transmit main and order wire signals, comprising the steps of:

specifying a transmission apparatus which is to transmit test data as a specified transmitting apparatus, and a transmission apparatus which is to receive test data as a specified receiving apparatus;

transmitting the test data from the specified transmitting apparatus to the order wire line in response to a start of test;

receiving and temporarily storing the test data in the specified receiving apparatus;

transmitting to the specified transmitting apparatus one of the stored received test data, analyzed data of the received test data, and judgement data indicative of a judgment result of a comparison of the analyzed data and threshold values, after a predetermined time or at a specified time;

monitoring, in the specified transmitting apparatus, the quality of the order wire line between the specified transmitting apparatus and the specified receiving apparatus; and

Cont B'

judging a failure of the order wire line caused by accumulation of quantization errors if at least one of conditions (S'S) < T, (S'/Nmax) < U and Nmax > V is satisfied, where S' denotes a signal level of a fundamental wave of the analyzed data obtained by carrying out a discrete Fourier transform with respect to the received test data, Nmax denotes a maximum noise level, S denotes a signal level of the transmitting test data, T, U and V are threshold values, T denotes a signal level with which communication is possible, U denotes a signal-to-noise ratio level with which communication is possible, and V denotes a set noise level.